REMARKS

The following remarks are made in response to the Non-Final Office Action mailed November 16, 2005. In that Office Action, the Examiner rejected claims 1-5, 8-14, and 18-21 under 35 U.S.C. §102(b) as being anticipated by Watanabe et al., U.S. Patent No. 6,107,637 ("Watanabe"). Claims 1, 2, 4, 8, and 18 were rejected under 35 U.S.C. §102(b) as being anticipated by McCord et al., U.S. Patent No. 6,597,006 ("McCord"). Claims 1-6 and 8-21 were rejected under 35 U.S.C. §103(a) as being unpatentable over Watanabe in view of McCord. Claims 15-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over Watanabe. Claim 6 was rejected under 35 U.S.C. §103(a) as being unpatentable over Watanabe in view of McCord. Claim 7 was rejected under 35 U.S.C. §103(a) as being unpatentable over Watanabe in view of McCord as applied to claim 6 above, and further in view of O'Dell et al., U.S. Patent No. 6,324,298 ("O'Dell").

With this Response, claims 1, 11, and 18 have been amended. Claims 1-21 remain pending in the application and are presented for reconsideration and allowance.

Objection to the Abstract

The Abstract was objected to as not "accurately portray[ing] the features of the claimed invention." NFOA 11-16-05 at p. 2. It is believed that the amended Abstract presented herewith complies with the Examiner's requirement. As such, withdrawal of the objection is respectfully requested.

Support for Claim Amendments

The amendments to claims 1 and 18 are supported throughout the specification, for example at FIG. 1 (clearly showing an auxiliary sensor at an offset from a field of view of a primary inspection device); page 5, lines 7-8 and page 4, lines 20-24 (describing that a calibrator is optionally used to find an offset between an auxiliary sensor and a primary inspection device lens or matrix of lenses).

The amendments to claim 11 are supported throughout the specification, for example at page 4, lines 24-29 (describing collection and interpolation of x-y-z coordinates for a plurality of collected points to calculate heights over a wafer surface and using the data in a path planning system to move through a variety of inspection points).

35 U.S.C. §§ 102 and 103 Rejections

Independent claim 1 stands rejected under 35 U.S.C. § 102(b) as anticipated by Watanabe, under 35 U.S.C. § 102(b) as anticipated by McCord, and under 35 U.S.C. § 103 as unpatentable over Watanabe in view of McCord. Claim 1 as amended relates, in part, to an inspection system including a primary optical inspection device including a focusing mechanism for focusing the primary optical inspection device over a predetermined field of view to optically inspect a sample. The system also includes an auxiliary sensor apart from the focusing mechanism, the auxiliary sensor for mapping a sample height by obtaining height data for at least one point on the sample, wherein the at least one point is offset from the optical field of view of the primary optical inspection device. For at least the reasons described below, the cited references fail to teach or suggest such limitations.

The cited references fail to teach or suggest an auxiliary sensor for mapping a sample height by obtaining height data for at least one point on the sample, the at least one point at an offset from the optical field of view of the primary optical inspection device as required by the limitations of claim 1 as amended. As a preliminary matter, McCord is not a proper § 102(b) reference as otherwise indicated in the Office Action as the application claims priority to a provisional application filed July 18, 2002 and McCord's earliest publication date is July 22, 2003. Additionally, as expressly recognized by the Examiner, "Watanabe teaches that the inspection device is a scanning electron beam device, not an optical inspection device." NFOA 11-16-05 at p. 6 (emphasis added). "To anticipate a claim, the reference must teach every element of

the claim." MPEP § 2131. Thus, both of the rejections under § 102(b) as anticipated by Watanabe and as anticipated by McCord are fully traversed.

Furthermore, Watanabe teaches a method of height determination by directing various slit patterns onto an inspection surface as close as possible to a center of visual field of an electron beam measuring system. *See*, *e.g.*, Watanabe at col. 15, ll. 35-40 (indicating that height detection optical apparatus 200a is "installed about an optical axis 110 of an electron beam symmetrically with respect to the sample 106") (emphasis added); col. 15, ll. 51-55 (indicating that "a multi-slit shaped pattern is projected at the measurement position on the sample 106 for detecting an SEM image....") (emphasis added); col. 33, ll. 59-64 ("By using as many slits [as possible], a slit that is projected onto the sample 106 close to the optical axis of the upper observation system 110 is always found....) (emphasis added). Thus, Watanabe actually teaches away from obtaining height data for at least one point on a sample, wherein the at least one point is offset from the optical field of view of the primary optical inspection device, as Watanabe repeatedly teaches that it is advantageous to measure as close as possible to an optical axis 110 of an electron beam. It is improper to modify a reference where it teaches away from a proposed modification. *See* MPEP §2145(X)(D). Thus, one having ordinary skill in the art would not be motivated to modify Watanabe to incorporate such limitations.

McCord also fails to teach or suggest an auxiliary sensor for mapping a sample height by obtaining height data for at least one point on a sample, wherein the at least one point is offset from an optical field of view of a primary optical inspection device as required by the limitations of claim 1 as amended. While McCord references on-axis and off-axis systems generally (e.g., col. 3, ll. 35-56), McCord does not mention obtaining height data at an offset from an optical field of view of a primary optical inspection device. In particular, an off-axis system is not inherently indicative of measuring at an offset from an optical field of view of a primary optical inspection device. In fact, one having ordinary skill would more likely be motivated to measure as

close as possible to an optical axis, and therefore within any field of view of the system of McCord, as evidenced by the Watanabe disclosure. One reason would be to mitigate such problems as a reduction in "a high level of precision due to pattern-induced measurement errors" as otherwise indicated by McCord. McCord at col. 3, ll. 55-57. Thus, absent some reason for doing so, one having ordinary skill in the art would not be motivated to modify McCord to incorporate the limitations of claim 1 as amended.

In sum, the cited references fail to teach or suggest the limitations of claim 1 as amended, in fact, teaching away from such limitations. As such, the rejections of claim 1 as amended under 35 U.S.C. §§ 102 and 103 are believed traversed. Withdrawal of the rejections, allowance of claim 1 as amended, and notice to that effect are respectfully requested.

Independent claim 18 as amended incorporates limitations similar to those described above in association with independent claim 1. In particular, claim 18 as amended relates, in part, to obtaining a pattern of height data of a surface of the wafer using an auxiliary sensor, wherein the pattern of height data is obtained outside the optical field of view of an inspection sensor. As referenced above, Watanabe specifically teaches directing a multi-slit pattern as close as possible to an electron beam optical axis 110 to obtain height measurements. Watanabe at col. 33, ll. 59-64 ("By using as many slits [as possible], a slit that is projected onto the sample 106 close to the optical axis of the upper observation system 110 is always found....) (emphasis added). McCord is also unavailing in this respect. As referenced above, McCord fails to teach or suggest a pattern of height data obtained outside an optical field of an inspection sensor.

In sum, claim 18 as amended is believed to be patentably distinct from the cited references. As such, withdrawal of the rejection of claim 18, allowance of claim 18 as amended, and notice to that effect are respectfully requested.

Independent claim 11 stands rejected under 35 U.S.C. § 102 as anticipated by Watanabe and under 35 U.S.C. § 103 as unpatentable over Watanabe in view of

McCord. Claim 11 as amended relates, in part, to an inspection system including a camera for inspecting a wafer surface and a 3D point sensor. The 3D point sensor is apart from the camera and is for generating height data for a plurality of points on the wafer surface. The system also includes a wafer mapping module for using the height data to generate a three-dimensional height map of the wafer surface prior to an inspection of the wafer surface. In particular, the three-dimensional height map is used for setting the focus of the camera during the inspection. For at least the reasons described below, the cited references fail to teach or suggest such limitations.

In particular, the cited references fail to teach or suggest a wafer mapping module that uses height data from a 3D point sensor to generate a three-dimensional height map of a wafer surface prior to an inspection of the wafer surface. Watanabe repeatedly teaches away from mapping prior to an inspection. For example, at column 1, lines 19-36, Watanabe indicates that methods of premapping using SEM images are time consuming, potentially damaging to samples, and potentially inaccurate. Instead, Watanabe attempts to remedy such premapping deficiencies by

> provid[ing] an electron beam exposure [] system... in which the height of the surface of the inspected object can be detected real time and the electron optical system can be controlled real time so than an electron beam image (SEM image) of high resolution without image distortion can be obtained by continuous movement of the stage, an inspection efficiency and its stability can be improved and in which an inspection time can be reduced.

Watanabe at col. 1, l. 65 – col. 2, l. 5 (emphasis added).

The Office Action cites column 16, lines 44-48 of Watanabe as teaching "mapping the sample height is performed as a separate operation before the inspection of the sample...." NFOA 11-16-05 at p. 7. However, this section of Watanabe simply refers to the process of determining height "real time" and continuously focusing an electron beam on a surface of a sample 106. Continuous generation of height data and

focusing an electron beam according to such data does not teach or suggest generating a three-dimensional height map of a wafer surface prior to an inspection of the sample as required by the limitations of claim 11 as amended. In fact, by teaching a system of continuous height measurement and substantially concurrent electron beam focus control, Watanabe, in fact, teaches away from generating a three-dimensional height map of a wafer surface prior to an inspection. Furthermore, the slit patterns of Watanabe are aligned to measure a height of a point along a line, which could not otherwise generate a three-dimensional height map of a sample according to the processes described by Watanabe.

In turn, McCord specifically teaches a system that is configured to maintain an absolute height of a specimen in approximately real time. In particular, McCord indicates that generating a focus map prior to inspection increases process time and then indicates that the system of McCord allows generation of a focus map to be eliminated to advantageously decrease process time and increase throughput. McCord at col. 4, ll. 33-46. As such, McCord specifically teaches away from generating any height map of a wafer surface prior to an inspection of the wafer surface.

In sum, the cited references fail to teach or suggest the limitations of claim 11 as amended, in fact, teaching away from such limitations. As such, the rejections of claim 11 as amended under 35 U.S.C. §§ 102 and 103 are believed traversed. Withdrawal of the rejections, allowance of claim 11 as amended, and notice to that effect are respectfully requested.

Additionally, claims 2-10, 12-18, and 19-21 depend, in some form, from independent claims 1, 11, or 18 as amended. For at least the reason that those claims incorporate the limitations of the independent claims, withdrawal of the rejections of those dependent claims, allowance of those claims, and notice to that effect are also respectfully requested.

The dependent claims can also be further distinguished from the cited references. For example, dependent claim 6 relates, in part, to the auxiliary sensor of

claim 1 measuring a difference in height of features on a sample. Claim 6 stands rejected under 35 U.S.C. § 103 as unpatentable over Watanabe in view of McCord. In particular, the Office Action indicates that McCord teaches measuring height differences of features at column 18, lines 54-65. NFOA 11-16-05 at p. 11. However, that portion of McCord simply references taking a difference between two PSDs to eliminate measurements of any patterns to reduce pattern induced error. In other words, McCord teaches away from measuring a difference in height of features on a sample. For at least such additional reasons, it is believed that claim 6 is patentable over the cited references and should be deemed allowable.

As another example, dependent claim 17 relates, in part, to the 3D point sensor of claim 11 being a confocal point sensor. Claim 17 stands rejected under 35 U.S.C. § 103 as unpatentable over Watanabe and Watanabe in view of McCord. In rejecting claim 17, the Office Action indicates that Watanabe does not teach a confocal 3D point sensor, but that it would be obvious to incorporate such a sensor to "minimize the number of optical components required and achieve high resolution." NFOA 11-16-05 at p. 9. Watanabe provides absolutely no guidance for incorporating a confocal 3D point sensor to replace the height detection apparatus 200. Indeed, the Office Action's proffered motivation for modifying Watanabe, "to minimize the number of optical components required and achieve high resolution," is not believed to be demonstrated anywhere in the cited references. It is by no means clear how incorporation of a confocal 3D point sensor would interact with the system described in Watanabe, much less that there would be a reduction in the number of components and achievement of higher resolution. As such, there is no reasonable expectation of success in making such a modification. *See* MPEP § 2143. For at least such additional reasons, it is believed that claim 17 is patentable over the cited references and should be deemed allowable.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1-21 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1-21 are respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Timothy A. Czaja at Telephone No. (612) 573-2004, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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CERTIFICATE UNDER 37 C.F.R. 1.8:

The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail, in an envelope address to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 16th day of **February, 2006**.

By: _____
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